

Serial No.: 10/726,013
Docket No. 03043-1
FUS.064

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APR 19 2007

REMARKS

An Excess Claim Fee Payment Letter is submitted herewith for 3 excess total claims.

Claims 1-23 are all the claims presently pending in the application. Claims 1-5 and 7-20 have been have been amended to more particularly define the invention. Claims 21-23 have been added.

It is noted that the claim amendments are made only for more particularly pointing out the invention, and not for distinguishing the invention over the prior art, narrowing the claims or for any statutory requirements of patentability. Further, Applicant specifically states that no amendment to any claim herein should be construed as a disclaimer of any interest in or right to an equivalent of any element or feature of the amended claim.

Claims 1 and 3-18 stand rejected under 35 U.S.C. § 112, second paragraph as allegedly being indefinite.

Applicant notes that claims 3-4, 9 and 13-19 are not subject to a prior art rejection and therefore, would presumably be allowable if the alleged informalities are addressed.

Claims 1-2, 5-8, 10-12 and 20 stand rejected under 35 U.S.C. § 102(b) as being allegedly unpatentable over Yamauchi et al. ("Dynamic Surface Modification of Lithium Metal Anode with Imide Electrolyte").

These rejections are respectfully traversed in view of the following discussion.

I. THE CLAIMED INVENTION

The claimed invention (e.g., as recited in claim 1) is directed to an electrolyte for a secondary battery including an aprotic solvent including an electrolyte salt, an imide anion and a transition metal ion, which are in the aprotic solvent and can form a metal complex on an anode at least through a charge-discharge process, and a compound comprising a sulfonyl group in the aprotic solvent.

Conventional devices may create a surface film on a lithium metal anode by using an imide electrolyte. For example, a surface film made of an $\text{Eu}[\text{N}(\text{C}_2\text{F}_5\text{O}_2)_2]_3$ complex may be formed on Li metal dipped in an electrolyte which is prepared by dissolving $\text{LiN}(\text{C}_2\text{F}_5\text{O}_2)_2$ acting as a lithium salt into a mixed solvent of propylene carbonate or ethylene carbonate and 1,2-dimethoxyethane

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and further by adding $\text{Eu}(\text{CF}_3\text{SO}_3)_3$ as an adding agent thereto (Application at page 6, line 1-page 7, line 21). However, in these conventional devices the surface film is deteriorated after repeated use.

The claimed invention, on the other hand, includes a compound comprising a sulfonyl group in the aprotic solvent (Application at page 9, lines 6-15). This compound may contribute to the formation of a passivation film on an anode surface resulting in the suppression of the decomposition of the solvent molecule.

II. THE 35 U.S.C. § 112, SECOND PARAGRAPH REJECTION

The Examiner alleges that claims 1 and 3-18 are indefinite. However, Applicant would point out that the claims have been amended to address the Examiner's concerns.

Specifically, Applicant notes that claim 1 has been amended to replace "ainon" with "anion".

Claims 3 and 18 have been amended to replace "sulforane" with "sulfolane".

In addition, attached hereto as Exhibit 1 is Rademacher et al. (U. S. Patent No. 4,689,412) which includes a description of an **alkane sulfonic acid anhydride**, attached hereto as Exhibit 2 is Morimoto et al. ("Can α -sultone exist as a chemical species? First experimental implication for intermediacy of α -sultone", *Chem. Commun.*, 2000, 189-190, The Royal Society of Chemistry, 2000) which includes a description of γ -sultone, and attached hereto as Exhibit 3 is Mori (U. S. Patent Publication No. 2003/0148191) which includes a description of **vinylene carbonate derivative** (e.g., see Mori at [0021]).

Applicant notes that the attached Exhibits are provided only to assist the Examiner in his understanding of the terms included in the claims. The contents of the article should not be incorporated into the specification of the present Application and should not be construed as describing the claimed invention in any manner.

In view of the foregoing, the Examiner is respectfully requested to withdraw this rejection.

III. THE ALLEGED PRIOR ART REFERENCE

The Examiner alleges that Yamauchi teaches the invention of claims 1-2, 5-8, 10-12 and 20.

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Applicant submits, however, that Yamauchi does not teach or suggest each and every element of the claimed invention.

Yamauchi is discussed in detail in the Background section of the Application, and discloses forming a surface film made of an $\text{Eu}[\text{N}(\text{C}_2\text{F}_5\text{O}_2)_2]_3$ complex on Li metal dipped in an electrolyte which is prepared by dissolving $\text{LiN}(\text{C}_2\text{F}_5\text{O}_2)_2$ acting as a lithium salt into a mixed solvent of propylene carbonate or ethylene carbonate and 1,2-dimethoxyethane and further by adding $\text{Eu}(\text{CF}_3\text{SO}_3)_3$ as an adding agent thereto (Application at page 6, line 1-page 7, line 21).

However, Applicant submits that Yamauchi does not teach or suggest an electrolyte including "*a compound comprising a sulfonyl group in the aprotic solvent*", as recited in claim 1 and similarly recited in claim 10. As noted above, this compound may contribute to the formation of a passivation film on an anode surface resulting in the suppression of the decomposition of the solvent molecule (Application at page 9, lines 6-15).

Clearly, this feature is not taught or suggested by Yamauchi.

Indeed, Applicant would first point out that Yamauchi is discussed in detail in the Background section of the Application, and discloses forming a surface film made of an $\text{Eu}[\text{N}(\text{C}_2\text{F}_5\text{O}_2)_2]_3$ complex on Li metal dipped in an electrolyte which is prepared by dissolving $\text{LiN}(\text{C}_2\text{F}_5\text{O}_2)_2$ acting as a lithium salt into a mixed solvent of propylene carbonate or ethylene carbonate and 1,2-dimethoxyethane and further by adding $\text{Eu}(\text{CF}_3\text{SO}_3)_3$ as an adding agent thereto (Application at page 6, line 1-page 7, line 21).

Moreover, as Applicant points out in the Background sections of the Application, a surface film formed by the method disclosed in Yamauchi is deteriorated after repeated use. Therefore, Yamauchi clearly does not teach or suggest the claimed invention which includes a compound (including a sulfonyl group) which may contribute to the formation of a passivation film on an anode surface resulting in the suppression of the decomposition of the solvent molecule (Application at page 9, lines 6-15).

Further, the Examiner simply alleges that "Yamauchi et al. teaches an imide electrolyte comprising a transition metal complex with imide anion as ligands" (Office Action at page 3), and later, the Examiner states that "Yamauchi et al. shows in Figure 2. b) on page 24, $10\text{mMNd}(\text{CF}_3\text{SO}_3) + \text{LiBETI/PC}$ ".

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Thus, presumably the Examiner is alleging that either $\text{Nd}(\text{CF}_3\text{SO}_3)$ or LiBETI/PC is equivalent to the "compound comprising a sulfonyl group" in the claimed invention. This is clearly unreasonable.

In fact, Applicant would point out that $\text{Nd}(\text{CF}_3\text{SO}_3)$ is neodymium trifluoromethanesulphonate which does not include a sulfonyl group (e.g., $-\text{S}(=\text{O})_2-$). Therefore, it is completely unreasonable to attempt to equate the $\text{Nd}(\text{CF}_3\text{SO}_3)$ in Yamauchi with the "compound comprising a sulfonyl group" in the claimed invention.

Further, Applicant would point out that LiBETI/PC is lithium bis(perfluoroethanesulfonyl) imide/propylene carbonate. That is, LiBETI is an lithium salt in the Yamauchi device. Therefore, it is completely unreasonable to equate LiBETI with the compound comprising a sulfonyl group in the aprotic solvent (e.g., the aprotic solvent including an electrolyte salt) of the claimed invention.

Therefore, Applicant submits that Yamauchi does not teach or suggest each and every element of the claimed invention. Therefore, the Examiner is respectfully requested to withdraw this rejection.

IV. FORMAL MATTERS AND CONCLUSION

In view of the foregoing, Applicant submits that claims 1-23, all the claims presently pending in the application, are patentably distinct over the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue at the earliest possible time.

Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary in a telephonic or personal interview.

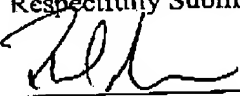
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The Commissioner is hereby authorized to charge any deficiency in fees or to credit any overpayment in fees to Attorney's Deposit Account No. 50-0481.

Respectfully Submitted,

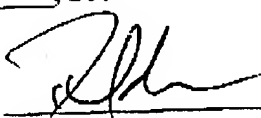
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CERTIFICATE OF FACSIMILE TRANSMISSION

I hereby certify that the foregoing Amendment was filed by facsimile with the United States Patent and Trademark Office, Examiner Laura Weiner, Group Art Unit # 1745 at fax number (571) 273-8300 this 19th day of April, 2007.


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